



Univerza v Mariboru

Medicinska fakulteta

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	Medicinska informatika, e-zdravje in medicinska statistika
Course title:	Medical informatics, e-Health and medical statistics

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
		2	3

Vrsta predmeta / Course type

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Laboratory work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
20	10		30			3

Nosilec predmeta / Lecturer:

prof. dr. Dejan Dinevski, doc. dr. Petra Povalej Bržan

Jeziki /
Languages:
 Predavanja /
Lectures:
Vaje / Tutorial:

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Elementarno znanje statistike (pridobljeno pri predmetu Metode raziskovalnega dela v medicini)

Prerequisites:

Elementary knowledge of Statistics (acquired from course Research Methods in Medicine)

Vsebina:**Content (Syllabus outline):**

Medicinska informatika in e-zdravje

- Osnove računalništva in informatike, lastnosti informacije, prvine informacijskih sistemov
- Internet – razvoj in lastnosti, internetne storitve, svetovni splet, splet 2.0, semantični splet in uporaba v medicini
- Informacijska varnost – varnostne zahteve in mehanizmi ter pravni in etični vidiki varovanja informacij na zdravstvenem področju
- Definiranje informacijskih procesov obravnave in oskrbe pacienta v zdravstvenih institucijah
- Signali, slike in video v medicini, informacijska predstavitev dvodimenzionalnih in 3D struktur
- Biomedicinska informatika in klinična informatika: osnove, namen, področja uporabe v medicini in raziskovanju
- Medicinski informacijski standardi – DICOM, HL7, IHE
- E-izobraževanje v medicini in virtualni pacienti
- E-zdravje, zdravstvena omrežja, bolnišnični informacijski sistemi, elektronski zdravstven karton, standardi v e-zdravju
- Telemedicina; zgodovina, tehnologije telemedicine, praktične aplikacije telemedicine (telekonzultacije, medicinska obravnava na daljavo, nega na daljavo, nadzor bolnika na daljavo) dokazane prednosti na posameznih področjih telemedicine

Medicinska statistika

Ponovitev osnovnih statističnih testov:

- Inferenčna statistika
- Bivariatni parametrični testi
- Bivariatni neparametrični testi

Multipla linearna regresija

- linearni regresijski model
- predpostavke
- mere ustreznosti modela
- interpretacija rezultatov

Medicine and Information Technology

- Basics of computer science and informatics, properties of information and information systems
- Internet – development and properties, internet services, world wide web, web 2.0, semantic web and usability in medicine
- Information security – security technologies and requirements, legal and ethical aspects of information protection in health systems
- Information processes definition in the field of medical treatment and care in health institutions
- Signals, graphics and video in medicine, information formats of 2D and 3D entities
- Biomedical informatics, clinical informatics: basics, purpose, application fields in medicine and research work.
- Medical information standards – DICOM, HL7, IHE
- E-learning in medicine and virtual patients.
- E-health, health networks, hospital information systems, electronic health record, e-health standards.
- Telemedicine; history, telemedicine technologies, applications of telemedicine in medical practice (teleconsultations, tele-medical treatment, telecare) evidence based advantages of telemedicine in particular medical areas.

Medical statistics

A review of basic statistical tests:

- Statistical inference
- Bivariate parametric tests
- Bivariate nonparametric tests

Multiple linear regression

- linear regression model
- assumptions
- adequacy of the model
- interpretation of the results

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Temeljni literatura in viri / Readings:

- Shortliffe EH, Cimino J: Biomedical Informatics, Springer USA, 2006
- Grasczew G and Roelofs TA, Advances in Telemedicine: Technologies, Enabling Factors and Scenarios, InTech Open Publishing 2011; chapter: Dejan Dinevski et al., Video Communication in Telemedicine
- Holzinger A: Biomedical informatics, Medical University Graz, Published by BoD, Germany, 2012
- Riffenburgh RH: Statistics in Medicine, Elsevier Ltd, Oxford, August 2012.
- Field A: An Adventure in Statistics: The Reality Enigma, SAGE Publications Ltd, May 2016.

Cilji in kompetence:

Medicinska informatika, e-zdravje

- Doseči vse tri ravni informacijske pismenosti ter spoznati elemente in principe informacijske družbe.
- Pridobiti raven znanja in spretnosti za samostojno praktično uporabo informacijskih aplikacij za študij in v medicinski praksi
- Razviti sposobnost vrednotenja, iskanja, selekcije in umeščanja novih informacij ter pridobiti zmožnost njihove interpretacije in ocene relevantnosti v medicinskem kontekstu
- Spoznati področje in standarde medicinske informatike in vidike e-zdravja

Statistični del predmeta prispeva predvsem k razvoju naslednjih kompetenc:

- usposobljenost za ustrezno pripravo podatkov za izvedbo statistične analize
- usposobljenost za uporabo osnovnih statističnih testov in razvoj regresijskih modelov

Objectives and competences:

Medical informatics, e-Health

- Acquire all three levels of information literacy and get to know the elements and principles of information society.
- To gain the knowledge for independent use of information applications for study and medical practice
- To develop the ability to evaluate, search, select and use the new information and capacity to interpret them in medical context.
- To get to know the field of medical informatics, its standards and the principles of e-Health applications

The learning unit on statistics contributes to the development of the following competencies:

- ability to adequately prepare the data for statistical analysis
- ability to use basic statistical tests and the development of regression models

- sposobnost razlage rezultatov uporabljenih statističnih analiz
- sposobnost uporabe pridobljenega znanja v praksi

- ability to interpret the results of the statistical analysis
- the ability to use the acquired knowledge in practice

Predvideni študijski rezultati:

Znanje in razumevanje:

- Poznavanje področij medicinske informatike in e-zdravja ter telemedicine
- Razumevanje temeljnih principov in standardov po katerih deluje prenos, shranjevanje in uporaba informacij ter delovanje medicinskih informacijskih sistemov
- Razumeti osnovne statistične pojme ter uporabo osnovnih statističnih testov.
- Razviti sposobnost za uporabo specifičnih statističnih testov in razumeti regresijsko modeliranje.
- Razviti sposobnosti, ki omogočajo dosledno razlago raziskovalnih podatkov in zagotavljajo ustrezne informacije o pridobljenih rezultatih.

Intended learning outcomes:

Knowledge and understanding:

- Acquired knowledge about medical informatics, e-Health and telemedicine
- Understanding basic principles and standards of data/information processes and usage. Understanding medical information systems. Understand basic statistical concepts and the use of basic statistical tests.
- Develop strategies to use specific statistical tests and understand basic regression modeling.
- Develop strategies that enable consistent interpretation of research data and provide correct information on study results .

Metode poučevanja in učenja:

- Predavanja
- Seminar
- Domače naloge
- Vaje, e-izobraževanje

Learning and teaching methods:

- Lectures
- Seminars
- Homework
- Exercises, e-learning

Načini ocenjevanja:

Način (pisni izpit, ustno izpraševanje, naloge, projekt)

Domače naloge 10%
Seminarska naloga 20%

Delež (v %) /

Weight (in %)

Assessment:

Type (examination, oral, coursework, project):

Homework 10%
Seminar work 20%

Pisni izpit 70% ŠTUDIJSKE OBVEZNOSTI ŠTUDENTOV Glede na sklep Senata z dne 13. 6. 2011 je za študente obvezna 50 % udeležba na predavanjih. POGOJI ZA PRISTOP K POSAMEZNEMU PREVERJANJU ZNANJA Opravljen seminar in vaje.		Written exam 70% ACADEMIC OBLIGATIONS OF STUDENTS According to the decision of the Senate on June 13, 2011, 50% attendance at lectures is obligatory for students. REQUIREMENTS FOR ACCESS TO INDIVIDUAL KNOWLEDGE CHECKING Completed seminar assignment and exercises.
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Reference nosilca / Lecturer's references:

DEJAN DINEVSKI

DINEVSKI, Dejan, MERTIK, Matej, KOKOL, Peter. Diagnosing mitral valve prolapse by improving the predictive power of classifiers. *Journal of international medical research*, ISSN 0300-0605, 2011, vol. 39, no. 3, str. 1075-1083. [COBISS.SI-ID 512130104]

HRISTOVSKI, Dimitar, DINEVSKI, Dejan, KASTRIN, Andrej, RINDFLESCH, Thomas C. Biomedical question answering using semantic relations. *BMC bioinformatics*, ISSN 1471-2105, 2015, vol. 16, no. 6, 14 str., doi: 10.1186/s12859-014-0365-3. [COBISS.SI-ID 2048297218]

VINKO, Matej, BRECELJ, Špela, ERŽEN, Ivan, DINEVSKI, Dejan. Sprejemanje in uporaba informacijskih tehnologij v slovenskem javnem zdravstvu : nacionalna raziskava z uporabo modela UTAUT = Acceptance and use of health information technology in Slovenian public health institutions : a national survey based on UTAUT model. *Zdravniški vestnik*, ISSN 1318-0347. [Tiskana izd.], apr. 2013, letn. 82, št. 4, str. 234-242. [COBISS.SI-ID 2888677]

DINEVSKI, Dejan, POVALEJ, Petra, KRAVOS, Matej. Intelligent data analysis for the diagnosis of alcohol dependence syndrome. *Journal of international medical research*, ISSN 0300-0605, 2011, vol. 39, no. 3, str. 988-1000. [COBISS.SI-ID 512129848]

POVALEJ, Petra, LENIČ, Mitja, ZORMAN, Milan, KOKOL, Peter, DINEVSKI, Dejan. Accuracy of intelligent medical systems. *Computer methods and programs in biomedicine*, ISSN 0169-2607. [Print ed.], 2005, vol. 80, suppl. 1, str. S95-S105. [COBISS.SI-ID 10105622]

PETRA POVALEJ BRŽAN

POVALEJ, Petra, VERLIČ, Mateja, ŠTIGLIC, Gregor. Discovery systems. V: MEYERS, Robert A. (ur.). *Encyclopedia of complexity and systems science*. New York: Springer, cop. 2009, vol. 2, str. 1982-2002, ilustr. [COBISS.SI-ID 1521572]

ŠTIGLIC, Gregor, POVALEJ, Petra, FIJAČKO, Nino, WANG, Fei, KALOUSIS, Alexandros, DELIBAŠIĆ, Boris, OBRADOVIĆ, Zoran. Comprehensible predictive modeling using regularized logistic regression and comorbidity based features. *PloS one*, ISSN 1932-6203, 2015, vol. 10, no. 12, str. 1-6, ilustr. <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0144439>, doi: 10.1371/journal.pone.0144439. [COBISS.SI-ID 2183076]

DINEVSKI, Dejan, POVALEJ, Petra, KRAVOS, Matej. Intelligent data analysis for the diagnosis of alcohol dependence syndrome. *Journal of international medical research*, ISSN 0300-0605, 2011, vol. 39, no. 3, str. 988-1000. [COBISS.SI-ID 512129848]

POVALEJ, Petra, GALLEGO, J.A., FARINA, Dario, HOLOBAR, Aleš. On repeatability of motor unit characterization in pathological tremor. V: *International Conference on Neurorehabilitation, ICNR 2012, Toledo, Spain, November 14-16, 2012*. PONS, José L. (ur.), TORRICELLI, Diego (ur.), PAJARO, Marta (ur.). *Converging clinical and engineering research on neurorehabilitation*, (Biosystems & Biorobotics, ISSN 2195-3562). Heidelberg [etc.]: Springer, cop. 2013, part 1, str. 553-556, ilustr. [COBISS.SI-ID 16456214]

FIJAČKO, Nino, POVALEJ, Petra, ŠTIGLIC, Gregor. Mobile applications for type 2 diabetes risk estimation : a systematic review. Journal of medical systems, ISSN 1573-689X, oct. 2015, vol. 39, iss. 10, 10 str.
<http://link.springer.com/article/10.1007/s10916-015-0319-y/fulltext.html>, doi:10.1007/s10916-015-0319-y.
[COBISS.SI-ID 2143908]